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ABSTRACT

Three groups of 12-month-old infants (10 deaf infants with hearing parents, 10 deaf infants with deaf parents, and 10 hearing infants with hearing parents) were videotaped during free play with mothers. Infant attention state was coded, identifying periods as: (1) unengaged, (2) onlooking, (3) object-attend, (4) person-attend, (5) supported joint attention, or (6) coordinated joint attention. Episodes of coordinated joint attention represent periods during which infants coordinate their attention between social partners and objects. Results indicated that deaf infants with hearing parents lagged behind the other two groups in demonstrating coordinated joint attention, suggesting that adults experienced with communication in the infants' primary modality promote the infants' development of attending behaviors. Similarity between the pattern of attention states shown by the two groups of infants whose parents share their children's hearing status suggests that audition has no unique role in the development of patterns of visual attention. (Author)

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DEAF INFANTS' COORDINATION OF ATTENTION TO PERSONS AND OBJECTS

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ABSTRACT

Three groups of 12-month-old infants (Deaf infants with Hearing parents, Deaf infants with Deaf parents, Hearing infants with Hearing parents) were videotpaed during free play with mothers. Infant attention state was coded, identifying periods as unengaged, onlooking, object-attend, person-attend, supported joint attention, or coordinated joint attention. Episodes of coordinated joint attention represent periods during which infants coordinate their attention between social partners and objects. Results indicated that Deaf infants with Hearing parents lagged behind the other two groups in demonstrating coordinated joint attention, suggesting that adults experienced with communication in the infants' primary modality promote the infants' development of attending behaviors. Similarity between the pattern of attention states shown by the two groups of infants whose parents share their hearing status suggests that audition has no unique role in the development of patterns of visual attention.

INTRODUCTION

During the first two years of life, infants become increasingly adept at organizing their visual attending behaviors into episodes which include attention to a person as well as an object. Such triadic attentional situations provide supportive settings for early cognitive and language development. Data have been gathered which trace the normative developmental progression of attending behaviors through infancy, culminating in the ability to coordinate attention to persons and objects in a communicative setting (Adamson & Bakeman, 1984). An issue which has been inadequately addressed, however, is the degree to which variations in experiences during infancy may affect the rate and pattern of development of attending behaviors.

This project represents an investigation of patterns of visual attending behaviors demonstrated by infants who are Deaf. Early interactive experiences vary considerably among Deaf infants--as does their rate of communication and language development. Hearing status of their parents is one factor consistently found to be associated with that variance. Deaf children with Hearing parents are at risk for social and communicative developmental difficulties, while those whose parents are Deaf have generally been reported to display developmental patterns like those of the Hearing children who have been the focus of most developmental studies (Meadow, 1980).

The course of development of attending behaviors by infants who are Deaf can provide information about issues related to the development of attention by all infants. To the extent that reception of auditory signals serve to direct an infant's attention away from an object of interest and toward a communicative partner, inability to receive auditory information might interfere with or delay infants' achievement of the ability to flexibly coordinate attention between persons and objects. Alternatively, it is conceivable that neurologically-intact infants possess the capacity to adapt to physiological differences like deafness and, by relying on receipt of visual and tactile information, keep pace with or even exceed the rate of development of visual attending behaviors by infants who can hear. In fact, MacTurk (1990) reported that Deaf infants produced more frequent social reference glances than Hearing infants did during a mastery motivation task involving a non-reacting adult investigator.

In most situations, however, infants engage in interactions with highly participatory adults. The communicative flow in such interactions is bi-directional, with behaviors of each participant influencing those of the other. Adaptation to demands of visual communication may, therefore, be a function of dyadic interactive history rather than a result of infant characteristics alone. Adults who have themselves successfully adapted to using the visual mode for communication may be particularly effective communicative partners for Deaf infants--serving as effective "tutors" for infants' developing visual attention behaviors. Some exploratory studies with small numbers of subjects have, in fact, reported that Deaf mothers seem to be particularly sensitive to and responsive to their Deaf infants' visual attention focus (Spencer, Gutfreund & Bodner-Johnson, 1992; Prendergast, 1991). In contrast, many Hearing mothers fail to use visual communication strategies effectively with their Deaf children even after participating in educational programs encouraging the use of signed language (Spencer, in press; Swisher, 1991). This may result in the mothers' being unable to effectively encourage their infants' developing patterns of sophisticated attentional behaviors such as that of coordinating attention to social partners and objects.

With these possibilities in mind, the current study investigated patterns of visual attention in Deaf and Hearing infants to address the following questions:

1. Does audition serve a unique role in infants' development of the ability to coordinate their attention between persons and objects? That is, do infants who are Deaf lag behind Hearing infants in their development of coordinated joint attention to objects and persons?

2. To what extent does a caregiver's experience communicating in the visual mode support an infant's development of the skill of coordinating person-object attention? That is, will Deaf infants with Deaf parents show more advanced attending behaviors than Deaf infants whose parents are Hearing and thus are less experienced with visual communication?

METHOD

Subjects. Three groups of infants and mothers participated in the study: 10 infants were Hearing with Hearing mothers (HH); 10 were Deaf and had Hearing mothers (DH); 10 were Deaf and had Deaf mothers (DD). Data were gathered when infants were within two weeks of their one-year birthday. Infants had no suspected or identified cognitive, motor, or medical disabilities. Hearing losses of infants in groups DH and DD were identified before 9 months of age. Degree of hearing loss ranged from moderate to profound.

All families were Caucasian, and Hearing parents spoke English as their primary language. Deaf parents used American Sign Language (with occasional "borrowed" Signed English elements) as their primary language. Six of the families in group DH used some signs (accompanied by speech) when communicating with their infants; the other four families chose to rely on speech without specific visual language accompaniment.

Data Collection. Mother-infant dyads were videotaped during 20 minutes of play with toys. Data were collected in a laboratory setting with two cameras (providing a split-screen picture) behind one-way mirrors. Mothers were told that the researchers were interested in the infants' "typical" communication and play behaviors and were asked to play with their infants as they would at home during free time.

Coding. Ten minutes of each interaction were coded using Adamson and Bakeman's system for identifying attention states (1984). (See Table 1.) The exhaustive, mutually-exclusive set of states includes: unengaged, onlooking, object-attend, person-attend, supported joint attend, coordinated joint attend. The category of "coordinated joint attend" represents coordination of attention to persons and objects. Dr Adamson assisted in training the two investigators (one Hearing, one Deaf) who established inter-rater reliability and coded the tapes. Based upon independent coding of four of the 30 videotapes, a mean Cohen's kappa of .84 (range .70-.92) was obtained. Simple percent of agreement was figured for each code separately and ranged from a high of 97% (object-attend) to a low of 75% obtained for the category of person-attend. Three of the tapes which had been coded early in the process were re-coded after a period of three months. A mean Cohen's kappa of .78 (range .75-.81) was obtained for intra-rater agreement over that time period.

RESULTS

Table 2 gives the mean, standard deviation, and median number of seconds in each category of attention state found for each group. Within-group variance was great and, because of skewed distributions and the small number of subjects in each group, Kruskal-Wallis one-way analysis of variance was used to test group differences. There were similarities in the groups' performance in the developmentally-earlier attention states. Each group spent the greatest amount of time focused on objects and the least amount of time in person-attend. However, group differences in time in "coordinated joint attend" approached statistical significance ($p=.07$). Groups HH and DD spent more time in this higher-level attention state than did group DH. This difference was also found in group comparisons of mean number of episodes occurring in each attention-state category. Group DH had fewer episodes of coordinated joint attention.

CONCLUSIONS

The strong similarity between distributions of time in each attention state for groups DD and HH show that auditory information plays no unique role in early development of attending behaviors. Visual and tactile interactive experiences can provide equivalent alternative means of achieving competence in coordinating attention to persons and objects.

The trend for Groups DD and HH to have more episodes of coordinated joint attention and, subsequently, to spend more time at that level than Group DH infants, suggests that communicative partners experienced with the communicative modality serving the infant more readily support the infant's developing attentional skills. It appears, therefore, that infants' development of attending behaviors is fostered by interaction with "experts" in the communication modality used and that "adaptation" occurs at the dyadic rather than monadic level. However, the evidence from this study is far from conclusive, and within-group differences were great. More study is needed to identify relative contributions from infant and caregiver on infants' development of visual attention behaviors.

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Table 1

SYSTEM FOR CODING INFANT ATTENTION STATE

(Modified from Adamson & Bakeman, 1984)

Unengaged: Infant's attention is unfocused; may be looking around aimlessly, sitting quietly with eyes "glazed," or moving about the room without any apparent goal.

Onlooking: Infant quietly (but with apparent interest) observes mother's activity.

Person: Engagement is strictly social, attention is directed toward mother, and infant is displaying social behavior in addition to gaze.

Object: Infant's attention is directed solely toward object with which she is engaged.

Supported Joint: Infant and mother are actively engaged with the same object, and mother's behavior is in some way influencing infant's action with object. However, infant gives no overt evidence of awareness of mother's involvement.

Coordinated Joint: Infant actively coordinates attention between mother and object with which he and/or mother are actively engaged. This is usually shown by infant's glancing from object to mother and back to object several times during an activity with object.

Table 2
Mean (s.d.) and Median Time (Seconds) in Attention States by Three Groups of Year-Old Infants

	Deaf Infant/ Deaf Mothers		Deaf Infants/ Hearing Mothers		Hearing Infants/ Hearing Mothers	
	Mean	Median	Mean	Median		
Unengaged	67.8 (56.9)	57.5	119.0 (72.3)	120.5	68.9 (79.6)	47.5
Onlooking	69.0 (49.9)	66.0	76.5 (56.6)	62.0	55.6 (34.8)	61.5
Object	293.0 (98.6)	287.5	232.7 (100.1)	192.5	300.8 (107.5)	321.5
Person	15.3 (33.2)	2.5	26.4 (39.0)	5.5	17.1 (30.1)	3.5
Supported Joint	79.7 (31.6)	87.5	117.1 (97.5)	79.0	85.8 (40.3)	86.5
Coordinated Joint*	75.5 (69.1)	58.0	28.3 (41.5)	3.5	71.8 (89.6)	35.0

* Deaf Infants w/Hearing Mothers < Deaf/Deaf & Hearing/Hearing ($p < .07$)